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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Stefan BADER et al.

Serial No.: 10/669,227

Filed: September 24, 2003

For: Radiation-Emitting Semiconductor Element

Examiner: ROSE, Kiesha L.
Group Art: 2822

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PRE-APPEAL BRIEF REQUEST FOR REVIEW

SIR:

This is a Request for a Panel Review of Issues on Appeal in accordance with the Office Gazette Notice dated July 12, 2005. The present request is filed concurrently with a Notice of Appeal, a request for a one-month extension of time, and is filed before an Appeal Brief. No amendments are being filed with this request.

Arguments supporting the Request for Review begin on page 2 of the present communication.

REMARKS

This Notice of Appeal and Request is filed in response to the final Office Action dated November 16, 2007.

The matters to be reviewed are whether independent claim 1 are unpatentable over U.S. Patent No. 6,465,808 ("Lin") in view of U.S. Patent No. 6,573,527 ("Sugiyama"),whether claim 26 is unpatentable over Lin in view of Marshall, and whether claim 27 is unpatentable over Lin in view of Coman.

Independent Claim 1

Independent claim 1 recites "a patterned contact layer applied on a surface of the semiconductor body for electrical contact connection, wherein the patterned contact layer has a thickness which is less than 100nm". The combined teachings of Lin and Sugiyama fail to teach this limitations because one skilled in the art would not replace the electrode 180 of Lin with the quantum dots 3b of Sugiyama, as suggested by the Examiner.

Lin discloses a structured electrode (180) on a p-type GaN layer (160) which is part of a semiconductor layer sequence (120, 130, 140, 150, 160) with the active layer (140). The electrode (180) of Lin is formed of a plurality of metallic opaque contact dots (182) covered by a transparent or reflective conductive layer (184) (see Figs. 4 and 5, and col. 4, lines 1-52 of Lin). The active layer (140) of the device of Lin can be formed as a quantum well structure (see col. 3, lines 46-52 of Lin). The Examiner acknowledges that Lin fails to teach or suggest "wherein the patterned contact layer has a thickness which is less than 100 nm", as recited in Applicants' independent claim 1.

Sugiyama discloses a quantum structure (3) that includes vertically aligned S-K mode quantum dots and quantum semiconductor devices that have such quantum well structures (see Fig. 1, col. 7, lines 16 to 17, and Figs. 15-20 of Sugiyama). The quantum structure (3) of Sugiyama includes a plurality of GaAs intermediate layers (3a), wherein "each of the intermediate layers (3a) carries therein a plurality of quantum dots (islands) (3b) of InAs, wherein each of the quantum dots (3b) are isolated from other quantum dots (3b) in each of the intermediate layers (3a)" (see col. 7, lines 20-27 of Sugiyama). Thus, Figure 1 of Sugiyama merely shows a semiconductor layer sequence that forms a quantum structure (3) that includes intermediate layers (3a) and islands (3b) that confine charge carriers. It is clear that the

intermediate layer (3a) and the islands (3b) of Sugiyama are not cannot be interpreted as an electrode contact layer, thus making the thickness of the islands (3b) irrelevant with respect to Applicants' recited invention.

Further, the InAs islands (3b) of Sugiyama cannot be substituted for the metallic contact dots (182) of Lin because the InAs islands (3b) are quantum structures and not electrodes. As for electrical contact connections, Sugiyama teaches that electrodes (31) and (32) in Fig. 15 are used for applying an electrical current to the active layer. However, Sugiyama fails to disclose the thickness of the electrodes (31) and (32). Thus, Sugiyama clearly fails to teach for suggest "wherein the patterned contact layer has a thickness which is less than 100 nm", as recited in Applicants' independent claim 1.

Moreover, combining the teaching of Lin and Sugiyama would only lead a person skilled in the art to modify the active layer (140) of Lin according to Sugiyama's quantum well structure (3). There is no teaching or suggestion in Sugiyama that would lead a person skilled in the art to pick the thickness of the carrier confining islands (3b) as an isolated feature, which is only related to a part of the active layer of the device of Sugiyama, and use it for modifying the electrode (180) of Lin. On the contrary, the combination of the teachings of Lin and Sugiyama as suggested by the Examiner is clearly improper as it is in clear contradiction to the disclosure of Sugiyama.

In response to Applicants' arguments, the Examiner asserts that the layer (3b) of Sugiyama is in the form of a metal and would have electrical properties and thus discloses Applicants' recited thickness. As stated above, Sugiyama clearly teaches that the "islands 3b of InAg" are made of semiconductor quantum dot material (see col. 7, line 39 of Sugiyama). In contrast, Lin teaches ohmic contact dots, which are of a metallic electrode material (see col 4, lines 8-9 of Lin). Thus, the electrical properties and the functionality of Lin's ohmic contact dots and Sugiyama's quantum dots are completely different. The combination of Lin and Sugiyama fail to teach or suggest Lin's metallic ohmic contact dots can be replaced by Sugiyama's semiconductor quantum dots.

Therefore, Lin and Sugiyama, whether taken alone or in combination, fail to teach or suggest "wherein the patterned contact layer has a thickness which is less than 100 nm", as recited in Applicants' independent claim 1.

Independent claim 26

Independent claim 26 recites "a patterned contact layer applied on a surface of the semiconductor body for electrical contact connection, wherein the patterned contact layer comprises contact elements that are separated from one another, and wherein the contact elements have the form of cylinders".

Lin discloses a structured electrode (180) that is formed of a plurality of metallic opaque contact dots (182). The object of Lin is to provide a device which has "contact dots which are in perfect ohmic contact with the p-type GaN layer 160" (see col. 4, lines 14-16 of Lin). This implies that there is a high thermal conductivity provided between the contact dots of Lin and the GaN layer (160). Further, the number of contact dots (182) of Lin must be sufficiently high so that "the current is uniformly spread to the p-type GaN (160) and the light intensity is hence enhanced. Also, the reliability of the light emitting device is improved"(see col. 4, lines 39-41 of Lin).

Marshall, on the other hand, discloses non-metallic microposts (14) made of poor thermal conductors, such as silicon, germanium, or gallium arsenide so that "thermal conduction through the support is minimized" (see col. 4, lines 39-40 and lines 43-44 of Marshall). Further, and as acknowledged by the Examiner, the microposts of Marshall are of cylindrical shape to minimize the total number of contact elements per unit area to the reflective layer.

Because Lin teaches making the number of contact dots (182) sufficiently high to provide uniform current spread, and Marshall teaches minimizing the number of microposts to minimize the thermal conductivity as much as possible, the teachings of Lin explicitly contradict the teachings of Marshall. Thus, a person skilled in the art would not be motivated to use the shape of the microposts of Marshall for the shape of the contact dots of Lin since the microposts of Marshall and the contact dots of Lin serve entirely different and contradictory functions.

Therefore, Lin and Marshall, whether taken alone or in combination fail to teach for suggest "a patterned contact layer applied on a surface of the semiconductor body for electrical contact connection, wherein the patterned contact layer comprises contact elements that are separated from one another, and wherein the contact elements have the form of cylinders", as recited in Applicants' independent claim 26.

In response to Applicants' arguments, the Examiner states that Marshall was only relied on to show a contact could be a cylindrical shape. Thus, the Examiner admits to have taken an

isolated feature of Marshall and combined it with the teachings of Lin. This is impermissible hindsight as Marshall provides no motivation to make make the contacts of Lin cylindrical.

Independent claim 27

The Examiner cites Fig. 3, element (26a), and paragraph [0006] of Coman as teaching "a light emitting device that contains a filler which contains a transparent and electrically conductive material", and that "the filler is a transparent and electrically conductive material to produce a highly reflective mirror".

However, a mirror comprising an electrically conductive material is not same as a filler containing insulating material as recited in independent claim 27.

Therefore, Lin and Coman, whether taken alone or in combination fail to teach for suggest "wherein the interspaces are filled with a filler in order to at least partially planarize the surface of the patterned contact layer", as recited in Applicants' independent claim 27.

Conclusion

In view of the above remarks, Lin, Sugiyama, Marshall, and Coman fail to teach or suggest the recited limitations of independent claims 1, 26, and 27. Accordingly, the rejection of independent claims 1, 26, and 27 should be withdrawn.

Dependent claims 2-7, 9-13 and 15-25, which depend from claim 1, are deemed to be allowable for at least the same reasons expressed above with respect to claims 1.

If any additional fees are required at this time in connection with the present application, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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